

**WE CLAIM:**

1. A synthetic peptide, or functional analog, derivative, fragment or mimetic thereof, homologous to glucagon, Exendin- and glucagon-like peptides wherein said peptide retains bioactivity in cellular and animal models.
2. A peptide of **Claim 1**, wherein said peptide has the sequence HSEGTFTSD (**SEQ. ID. NO: 1**).
3. A method of enhancing or facilitating learning, memory, and cognition in a mammal, comprising
  - a. administering a therapeutically effective amount of said synthetic peptide of **Claim 1** to said mammal; and
  - b. enhancing or facilitating learning, memory, and cognition in said mammal.
4. The method of **Claim 3**, wherein administration of said therapeutically effective amount of said synthetic peptide is to a systemic site of said mammal.
5. The method of **Claim 4**, wherein administration of said therapeutically effective amount of synthetic peptide is intranasal.
6. A method of enhancing or facilitating learning, memory, and cognition in a mammal, comprising
  - a. administering a therapeutically effective amount of said synthetic peptide of **Claim 2** to said mammal; and
  - b. enhancing or facilitating learning, memory, and cognition in said mammal.

7. The method of **Claim 6**, wherein administration of said therapeutically effective amount of synthetic peptide is to a systemic site of said mammal.
- 5 8. The method of **Claim 7**, wherein administration of said therapeutically effective amount of synthetic peptide is intranasal.
9. A method for the prophylactic and/or therapeutic treatment of a nervous system and/or neurological disease, disorder or condition associated with neuronal loss or dysfunction in a mammal, comprising
- 10 a. administering a therapeutically effective amount of said synthetic peptide of **Claim 1** to said mammal; and
- b. treating said neuronal loss or dysfunction in said mammal.
- 15 10. The method of **Claim 9**, wherein said nervous system and/or neurological disease, disorder, or condition is at least one of the group comprising Parkinson's Disease, Alzheimer's Disease, Huntington's Disease, ALS, stroke, ADD, and neuropsychiatric syndromes.
- 20 11. The method of **Claim 9**, wherein administration of said therapeutically effective amount of synthetic peptide is to a systemic site of said mammal.
12. The method of **Claim 11**, wherein administration of said therapeutically effective amount of synthetic peptide is intranasal.
- 25 13. A method for the prophylactic and/or therapeutic treatment of a nervous system and/or neurological disease, disorder or condition associated with neuronal loss or dysfunction in a mammal, comprising
- 30 a. administering a therapeutically effective amount of said synthetic peptide of **Claim 2** to said mammal; and
- b. treating said neuronal loss or dysfunction said mammal.

14. The method of **Claim 13**, wherein said nervous system and/or neurological disease, disorder, or condition is at least one of the group comprising Parkinson's Disease, Alzheimer's Disease, Huntington's Disease, ALS, stroke, ADD, and neuropsychiatric syndromes.

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15. The method of **Claim 13**, wherein administration of said therapeutically effective amount of synthetic peptide is to a systemic site of said mammal.

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16. The method of **Claim 15**, wherein administration of said therapeutically effective amount of synthetic peptide is intranasal.

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17. A method for the prophylactic and/or therapeutic treatment of disorders, diseases, or conditions of the nervous system associated with impaired learning, memory, and cognition in a mammal, comprising

- a. administering a therapeutically effective amount of said synthetic peptide of **Claim 1** to said mammal; and
- b. facilitating cognition in said mammal.

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18. The method of **Claim 17**, wherein administration of said therapeutically effective amount of synthetic peptide is to a systemic site of said mammal.

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19. The method of **Claim 18**, wherein administration of said therapeutically effective amount of synthetic peptide is intranasal.

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20. A method for the prophylactic and/or therapeutic treatment of disorders, diseases, or conditions of the nervous system associated with impaired learning, memory, and cognition in a mammal, comprising

- a. administering a therapeutically effective amount of said synthetic peptide of **Claim 2** to said mammal; and

b. facilitating cognition in said mammal.

21. The method of **Claim 20**, wherein administration of said therapeutically effective amount of synthetic peptide is to a systemic site of said mammal.

22. The method of **Claim 21**, wherein administration of said therapeutically effective amount of synthetic peptide is intranasal.

23. A functional analog, derivative, fragment, or mimetic of said synthetic peptide of **Claim 2**, wherein said functional analog, derivative, fragment, or mimetic retains the biological activity or function of **SEQ. ID. NO:1** in cellular and animal models.

24. A functional analog, derivative, fragment, or mimetic of said synthetic peptide of **Claim 1 or Claim 2**, wherein said functional analog, derivative, fragment, or mimetic is modified by at least a single amino acid charge and is truncated or extended by at least one amino acid and wherein said functional analog, derivative, fragment, or mimetic retains the biological activity or function of **SEQ. ID. NO:1** in cellular and animal models.

25. A functional analog, derivative, fragment, or mimetic of said synthetic peptide of **Claim 1 or Claim 2**, wherein said synthetic peptide has been modified by adding stearic acid or other residues to facilitate delivery or efficacy of said functional analog, derivative, fragment, or mimetic and wherein said functional analog, derivative, fragment, or mimetic retains the biological activity or function of **SEQ. ID. NO:1** in cellular and animal models.

26. A method for the administration of the synthetic peptide of **Claim 1 or Claim 2** to a mammal, wherein said delivery is to a systemic site of said mammal.

27.A method for the delivery of the synthetic peptide of **Claim 1** or **Claim 2** to a mammal, wherein said delivery is from an intranasal site.

5        28.A pharmaceutical composition comprising a pharmaceutically acceptable carrier and a therapeutically effective amount of the synthetic peptide of **Claim 1** or **Claim 2**.

10       29.A pharmaceutical composition of **Claim 28**, wherein said pharmaceutically acceptable carrier facilitates bioavailability and delivery of said therapeutically effective amount of the synthetic peptide to target tissues of a mammal.

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